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COSTS OF COMMERCIAL DRYING, STORING, AND HANDLING ROUGH RICE, 1965-66

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PREFACE

This survey is part of a program of research initiated by the Fibers and Grains Branch, Economic Research Service, USDA, on the costs of handling and storing grains at commercial facilities. Because rough rice is handled differently from other grains, particularly in the way it is dried, it was conducted as a separate study. Costs of handling and storing other grains were covered in earlier reports. Costs of Storing and Handling Grains in Commercial Elevators, 1964-65, ERS-288, which was updated by Costs of Storing and Handling Grain in Commercial Elevators, 1967-68 and Projections for 1969-70, ERS-401.

Acknowledgment is made to William A. Faught, Joseph L. Ghetti, and Allen G. Schienbein, of the Fibers and Grains Branch, for developing the basic cost allocation methodology adapted for use in this study, and for their assistance and suggestions during all stages of the study. Cleveland P. Eley assisted in the data collection.

Appreciation is also expressed for the cooperation of and helpful discussions with individuals in the rice industry, and to selected firms for allowing use of data from their plants. Rice dryer managers, foremen, bookkeepers, and others sacrificed time from busy work schedules to provide the detailed cost and operating data necessary for this study.

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SUMMARY

Many commercial rice dryer-storage firms can cut operating and facility costs by applying the functional cost data and analyses described in this report. In the three major rice-producing regions, the book cost total of receiving, drying, storing, and loading out for truck shipment was 55.8 cents per hundredweight in California; 73.5 in Arkansas-Mississippi; and 72.9 in Texas-Louisiana.

Receiving costs for a 32-firm sample ranged from 4.0 cents per hundredweight in Texas-Louisiana to 4.9 in California, and averaged 4.3. Drying costs were 10.5 cents in Texas-Louisiana and 15.1 in California; the regional average was 11.6. Storing costs averaged 45.7 cents per hundredweight, and ranged from 30.2 in California to 53.0 in Texas-Louisiana.

Book loading out costs for truck shipment averaged 5.4 cents per hundredweight and ranged from 5.3 in Texas-Louisiana to 6.1 in Arkansas. For shipment by rail, loading out costs reversed; they were 0.4 and 0.5 cent less than by truck, depending on the costing method used--4.2 in Arkansas-Mississippi and 5.4 in Texas-Louisiana.

Four main cost items--depreciation, interest, direct labor, and administrative overhead--accounted for most costs associated with commercial rice dryer operations. Depending on the costing method used and the region, these items accounted for 68 to 79 percent of total operating costs. Depreciation was the major cost item, except in California where labor was slightly higher.

Four types of costs were developed:

- Out-of-pocket (no allowance for depreciation and interest on investment);
- Book (including the firm's own figures for depreciation and interest on investment);
- Standardized (using standard depreciation rates and interest on investment of 6 percent of half the original acquisition cost);
- Replacement (including depreciation and interest).

The average volume stored during the year ranged from 30.7 percent of capacity in Arkansas-Mississippi to 43.2 in California. This indicated that rough rice was stored slightly longer in California than in the other regions--a more efficient use of low-cost flat storage.

Most rice receipts were green and required drying, although a small amount was received dry from on-farm or other commercial dryers. Green rice passed through the drying-tempering cycle an average of 4.1 times in Arkansas-Mississippi, 4.2 times in California, and 5.4 times in Texas-Louisiana.

The volume of rough rice dried as a percentage of plant capacity for rice ranged from 96.7 in California to 121.3 in Texas-Louisiana; the average for all regions was 111.9. This indicated that some rice was moved out right after drying to mills or other storages.

Highest monthly inventory--a measure of rough rice in storage at the end of the peak month, usually during harvest, divided by plant capacity for rice--averaged 72 percent.

COSTS OF COMMERCIAL DRYING, STORING,
AND HANDLING ROUGH RICE, 1965-66

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INTRODUCTION

As competition and rice handling and storage operating costs increase, efficiency becomes more important. If a commercial rice dryer operator is to be competitive and provide low-cost services while earning a reasonable profit, he must maintain a high degree of operating efficiency. Detailed cost information, by functions, provides a basis for operators to evaluate the impact on costs of such factors as type of storage facility, size or scale of operation, and variations in storage capacity utilized. Results of this study and others are combined into an analysis of the organization and operation of the rice industry.

These data and analyses are applicable and useful to the rice industry. Changes since 1965-66 would not affect the usefulness of these cost relationships.

Rice is normally harvested with moisture levels ranging from 18 to 26 percent. Since it cannot be safely held for long periods at these levels, the moisture content is generally reduced to about 12 to 14 percent before storing. At commercial dryers, this is accomplished artificially by use of aeration and heat. Although much of the moisture can be removed by aeration alone, use of heated air greatly reduces drying time, making it possible to handle larger volumes of rice in shorter periods.

As with most other crops, average length of the rice harvesting season has declined in recent years. Thus, the bulk of green paddy rice is now harvested within 4 to 6 weeks. Handling rates at commercial dryers, which provide both drying and storing facilities, must be geared to harvesting rates to compete effectively. Commercial rice dryers have attempted to keep pace with the rapid advances in harvesting technology through the adoption of better equipment and improved operating practices.

Objectives

The principal objective was to determine, describe, analyze, and evaluate detailed operating costs for rice dryer-storage operations, by functions, for all major U.S. rice producing regions.

Scope

Similarities in production practices and other important aspects peculiar to a given geographic area logically divide the rice belt of the United States into three principal regions: Arkansas-Mississippi, Texas-Louisiana, and California. Costs and related data were developed for all three regions individually and combined. Plant capacities for the universe from which the sample was drawn were taken from information provided by the Agricultural Stabilization and Conservation Service for the Commodity Credit Corporation for warehouses with CCC storage agreements. The universe for this study included all commercial rice dryers in Arkansas, Mississippi, Louisiana, Texas, and California.

Sampling Procedure

Rice dryers are classified into two types--commercial and on-farm. ^{1/} Commercial dryers are facilities available to the general public for the receiving, drying, and storing rough rice. On-farm dryers are privately owned facilities used primarily for drying and storing rice at points of production, and are not considered in this report. For dryers not approved for CCC storage, capacity ratings were obtained from firm records or manager's estimates. In either case, total plant capacity available was used as the sampling basis, regardless of actual use made of the facilities.

In sampling, the 279 plants making up the universe were first arrayed by total plant capacities, from small to large. This revealed a capacity span of individual firms ranging from less than 15,000 to over 3 million hundredweight. Most of these firms, however, had capacities of less than 250,000 hundredweight. To avoid including a disproportionately high number of small firms in the sample and to obtain a more realistic accounting of total crop movement, the stratified, random sampling technique was employed (table 1).

Methodology

A sample plant cost accounting approach was used, based on detailed cost data obtained by interviews with officials at each plant in the sample. In addition to cost data, detailed information on operating equipment, types and capacities of structures, volumes handled (by functions), drying and handling rates, crew sizes (by functions), other labor requirements, dryer layout, and rice flow patterns were established for each dryer. From these data, hours of machine operation and labor requirements were developed for each major function.

Other services such as handling of rice planting seed, other grains, seeds, fertilizers, and farm supplies were also provided by some commercial rice dryer operators. In this study, all identifiable costs associated with these extra services were eliminated. In Arkansas-Mississippi, joint use is generally made of rice drying and storing facilities with other grains, such as soybeans--a practice not observed to any extent in the other two regions. To provide for

^{1/} In this report, the term "dryer," when used in reference to a complete plant, means that drying and storage facilities are included.

Table 1.--Number and total plant capacity of rice dryers in universe and sample, by region and quartile groupings, 1965-66 1/

Region and quartile grouping	Universe <u>2/</u>		Sample	
	Population	Capacity	Population	Capacity
	No.	1,000 cwt.	No.	1,000 cwt.
<u>Combined regions</u>				
1.....	173	17,991	9	1,225
2.....	62	18,179	8	2,384
3.....	33	18,446	8	3,719
4.....	11	17,571	7	9,853
Total.....	279	72,187	32	17,181
<u>Arkansas-Mississippi</u>				
1.....	38	3,631	2	248
2.....	20	5,748	3	780
3.....	10	5,568	2	1,188
4.....	7	12,857	5	8,071
Total.....	75	27,804	12	10,287
<u>Texas-Louisiana</u>				
1.....	112	11,492	5	720
2.....	31	9,017	3	915
3.....	17	9,372	4	1,338
4.....	--	--	--	--
Total.....	160	29,881	12	2,973
<u>California</u>				
1.....	23	2,868	2	257
2.....	11	3,414	2	689
3.....	6	3,506	2	1,193
4.....	4	4,714	2	1,782
Total.....	44	14,502	8	3,921

1/ Includes both drying and storing facilities.

2/ All commercial dryers in Arkansas, Mississippi, Louisiana, Texas, and California.

intraregional comparisons of average occupancy and capacity utilization rates, along with other statistical indicators shown in this report, the total plant capacity data for Arkansas-Mississippi were reduced to the portion actually used for rice handling and storing during the 1965-66 season. There were 9,382,000 hundredweight less than the capacity used in sampling (table 2). In Texas-Louisiana and California similar adjustments were unnecessary. Costs in this report are therefore based on rough rice handling, drying, and storing activities only.

Table 2.--Estimated total plant capacity and utilization for rice handling and storing by regions, 1965-66 1/

Plant capacity	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	----- <u>-1,000 cwt.</u> -----			
Total.....	27,804	29,881	14,502	72,187
Utilized for rice.....	18,422	29,881	14,502	62,805

1/ Sample dryers in each region statistically expanded to represent universe total.

There is no standard unit of measurement employed universally for rough rice. In Texas-Louisiana, the most common industry measure is the barrel (162 pounds--green or dry); in Arkansas and Mississippi, the bushel (45 pounds--dry); and in California, the hundredweight or sack. 2/ The hundredweight (dry rice) was adopted as the basic unit of measurement for all three producing regions.

DRYER-STORAGE PLANT FUNCTIONS

The usual functions at commercial rice dryers are: receiving, drying, storing, and loading out. Most dryer managers include cleaning of green rice which occurs during the drying process as part of drying. Likewise, turning and aerating stored rice are usually considered part of storing. Volumes of rough rice handled are shown in table 3.

Receiving

Trucks generally transport green rice to dryers. Methods of receiving at dryers vary, depending upon such factors as location, age, and size of plant. The most common procedure is to weigh, sample, and grade at the first stop--the scale house. When scales and dump pits are located some distance apart, after weighing the truck is directed to the desired dump pit where it is unloaded mechanically by hydraulic hoist, cradle hoist, dragboard, or other means. Then it returns to the scale house to be reweighed.

Green rice is usually conveyed from the dump pit to the receiving leg by auger or belt conveyor. It is then lifted to the top of the headhouse where it

2/ Rice is commonly called rough or paddy rice whether green or dry until it is milled. Green or wet refers to rough or paddy rice with a high moisture content as it comes from the field at harvest time; dry rice refers to the rough or paddy rice after the moisture content has been reduced to 12 to 14 percent.

Table 3.--Estimated volumes of rough rice handled, at commercial rice dryers, by regions, 1965-66 1/

Handling activity	Volume handled in-- <u>2/</u>			
	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	----- <u>1,000 cwt.</u> -----			
Received <u>3/</u>	20,512	39,534	16,023	76,069
Dried.....	20,000	36,236	14,024	70,260
Highest monthly inventory <u>4/</u> ..	13,410	21,236	10,617	45,263
Average occupancy <u>5/</u>	5,023	9,041	5,766	19,830
Loaded out <u>6/</u>	14,700	31,605	12,103	58,408

1/ Sample data statistically expanded to represent regional totals.

2/ All volumes adjusted to dry weight basis.

3/ Sample volumes expended to regional production totals.

4/ Maximum volume of rice in storage at end of peak month of year.

5/ Average volume of rice in storage during year.

6/ Excludes volume moved directly to mills by conveyor systems and that loaded out for shipment by barge.

can be diverted either to the dryer or scalper-type cleaners, or dropped onto a gallery conveyor and moved to tempering tanks to await drying. 3/ Relatively clean, properly aerated green rice may be held in storage or tempering tanks for several days before or during the drying process. 4/

Almost all of the 1965 rice crop which was delivered to dryers in the Arkansas-Mississippi region was hauled in farm trucks (table 4). In Texas-Louisiana and California, 30 and 40 percent of the 1965 crop was hauled in commercial trucks. For the regions combined, approximately 3 times as much rough rice was hauled to commercial dryers in farm as in commercial trucks.

Drying

Improper drying can greatly reduce head yield and value. 5/ Therefore, green rice is normally dried gently several times to avoid cracking and checking the kernels. On each pass through the dryer column, the forced heated air

3/ Storage tanks used to hold green rice before and during drying are often called tempering tanks or bins.

4/ Calderwood, David L. and Hutchinson, Reed S., Drying Rice in Heated Air Dryers with Aeration as a Supplementary Treatment, U.S. Dept. Agr. Mktg. Res. Rpt. 508, Washington, D. C., 1961.

5/ Head yield refers to the proportion of whole kernel rice remaining after milling.

Table 4.--Receipts of rough rice by mode of transportation and compared with total capacities, by regions, 1965-66

Volume received--	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	-Percent-			
In farm-owned trucks.....	99.8	70.3	60.0	75.2
In commercial trucks.....	0.2	29.7	40.0	24.8
Compared with total capacity <u>1/</u> ...	111.3	132.3	110.5	121.1

1/ Based on portion actually used for rice handling and storing in 1965-66. In Arkansas-Mississippi, rice dryer-storage facilities were used jointly with other grains.

evaporates the moisture, which gradually migrates to the surface of the kernels during the tempering period of 6 to 24 hours between passes. 6/ After the moisture content is reduced to about 12 to 14 percent, the rice is then ready for storing.

Rough rice is sometimes stored (generally the flat type in California) at a moisture content above 14 percent and the excess moisture removed by aeration. Properly designed and operated aeration systems receive, dry, and store large volumes of green rice during a given time period, resulting in better utilization of dryer facilities.

Over 92 percent of total rice receipts at commercial dryers in 1965-66 for all regions combined were green and required drying (table 5). A considerable quantity of dried rough rice was transferred to mills or other storage facilities immediately after it was dried.

Green rice passed through the drying-tempering cycle an average of 4.1 times in Arkansas-Mississippi, 4.2 times in California, and 5.4 times in Texas-Louisiana, averaging 4.9 times. Dryer passes ranged from 2 to 8, depending upon: volume and moisture content of the green rice, plant layout, and operating practices.

Storing

Rice is stored in both upright and flat warehouses. 7/ Upright facilities are the most common, accounting for about 75 percent of all capacity and approximately 85 percent in both Arkansas-Mississippi and Texas-Louisiana (table 6). Only 40 percent of the total capacity in California was of the upright type.

6/ Calderwood, footnote 4.

7/ Upright warehouse--height greater than diameter or width. Flat warehouse--height less than diameter or width.

Table 5.--Comparison of volumes of rough rice dried to volumes received and to total capacities, by regions, 1965-66

Item	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	<u>Percent</u>			
Volume dried compared with:				
Volume received.....	97.5	91.7	87.5	92.4
Total capacity <u>1</u> /.....	108.6	121.3	96.7	111.9

1/ Based on portion actually utilized for rice handling and storing in 1965-66. In Arkansas-Mississippi, rice dryer-storage facilities were used jointly with other grains.

Table 6.--Types of warehouses at commercial rice dryers, and estimated capacity utilization for rice handling and storing, by regions, 1965-66 1/

Item	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	<u>Percent</u>			
Type of warehouse:				
Upright <u>2</u> /.....	84.0	85.8	39.6	74.6
Flat <u>3</u> /.....	16.0	14.2	60.4	25.4
Capacity utilization: <u>4</u> /				
Working <u>5</u> /.....	11.2	11.9	8.0	10.8
Storing <u>6</u> /.....	88.8	88.1	92.0	89.2

1/ Sample dryers in each region statistically expanded to represent universe totals.

2/ Height greater than diameter or width.

3/ Height less than diameter or width.

4/ Based on portion actually utilized for rice handling and storing, 1965-66. In Arkansas-Mississippi, rice dryer-storage facilities were used jointly with other grains.

5/ Average portion of total capacity utilized for receiving, drying, tempering, turning, and shipping rough rice.

6/ Average portion of total capacity utilized for storing rough rice. See appendix, "Definition of Terms," for detailed explanation of average working-storing capacity calculations.

Considerable upright space must be reserved as working space during receiving for tempering green rice between dryer passes, but after the drying season, this requirement greatly diminishes. The ratio of average working space to plant capacity used for rice averaged 10.8 percent for regions combined. ^{8/} Among the regions, the portion used for working space was lowest in California. Texas-Louisiana and Arkansas-Mississippi were about equal in this use--11.9 and 11.2 percent.

Receiving and drying rough rice puts great demands on dryer-storage facilities, but usually rice moves out fairly fast, resulting in relatively poor capacity use.

Highest monthly inventory--a measure of rough rice in storage at the end of the peak month compared with plant capacity used for rice--was almost identical in all regions (table 7). This indicates that over one-fourth of average plant capacity was used for receiving, drying, and tempering.

Table 7.--Highest monthly inventory and average occupancy volumes compared with total capacities, by regions, 1965-66

Item	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	Percent			
Highest monthly inventory volume:				
Compared with total capacity ^{1/}	72.7	71.1	73.2	72.1
Average occupancy volume:				
Compared with storage capacity ^{2/}	30.7	34.4	43.2	35.4

^{1/} Based on portion actually utilized for rice handling and storing, 1965-66. In Arkansas-Mississippi, rice dryer-storage facilities were used jointly with other grains.

^{2/} Total capacity less working space.

Loading Out

Rice is loaded out by several methods, depending mainly upon type of storage facility and mode of shipment used. Gravity is generally used when loading out for truck shipment from upright storage; the truck is weighed before and after loading. Various types of equipment are used to load rice directly from flat storage into trucks. In some situations, part or all of the rice in flat storage is moved to upright storage before loading out. This better utilizes labor, increases loadout rate, allows several trucks to load out at once, or allows weighing through a dump scale before loading out into rail cars.

^{8/} See appendix for detailed description of average working space and storage capacity calculations.

When a rice dryer and mill are both located on the same premises, a conveyor system is generally used to move rough rice from storage to mill. At some dryers, all dried and stored rice is moved directly to the mill by conveyor systems. These quantities are not included in loaded-out volumes.

Rough rice is shipped domestically almost entirely by truck or rail. ^{9/} About 56 percent of total shipments were by truck and the remainder by rail for all regions combined during the 1965-66 season (table 8), although ratios varied considerably among regions. For example, shipments by truck ranged from less than 14 percent in Arkansas-Mississippi to 100 percent in California. ^{10/} Rates, availability of other modes of transportation, and convenience are the chief factors determining the method of shipping rough rice for any given geographic area.

Table 8.--Loading out of rough rice for shipment by truck and rail, by regions, 1965-66

Type of transportation	Proportion of volume loaded out in--			
	Arkansas- Mississippi	Texas- Louisiana	California <u>1/</u>	Regions combined
	Percent			
Truck.....	13.7	58.6	100.0	55.9
Rail.....	86.3	41.4	<u>2/</u>	44.1

^{1/} A small volume was loaded out for barge shipment in California. To avoid disclosing the identity of the firm in the sample which employed this form of transportation, loading out for barge shipment was not included.

^{2/} No loadout for rail shipments was reported by sample dryers in California during survey period although a small volume of rough rice is normally loaded out for rail shipment in this area.

OPERATING COSTS

Four types of costs are shown: (1) out-of-pocket costs, which include no allowance for depreciation or interest on investment; (2) book costs, which include the firm's own figures for depreciation and interest on investment; (3) standardized costs, using standard depreciation rates and interest on

^{9/} A relatively small volume was shipped by barge in California. However, to avoid disclosing the identity of the firm in the California sample which employed barge transportation, loading out volumes and costs for shipment by barge were not reported.

^{10/} No loading out for rail shipment was reported by dryers in the California sample during the survey period, although this mode of transportation is normally used to move a small volume of rough rice in this area.

investment of 6 percent of half the original acquisition cost; and (4) replacement costs, including depreciation and interest based on 1966 replacement values.

Costs, per hundredweight, for individual regions and all regions combined were calculated by statistically weighting the sample plant data. Methods of cost allocation, replacement value estimation, standard depreciation rates, secondary data sources, and definitions of terms are in the appendix.

Total operating costs were allocated to the four functions commonly associated with dryer-storage plant operations--receiving, drying, storing, and loading out. Functional cost data, developed by costing methods, regions, and major cost items, are presented in tables in the sections which follow.

Receiving

Receiving costs were lowest in Texas-Louisiana and highest in California. Book receiving costs averaged 4.3 cents per hundredweight for regions combined, and ranged from 4.0 cents in Texas-Louisiana to 4.9 cents in California (table 9). For regions combined, out-of-pocket costs were 0.7 cent lower per hundredweight than book costs, while standardized and replacement costs were 0.2 and 0.5 cent higher. Similar cost relationships existed among costing methods within individual regions.

Drying

Book drying costs ranged from 10.5 cents per hundredweight in Texas-Louisiana to 15.1 cents in California, and averaged 11.6 cents for regions combined. The all-region averages by the other three costing methods shown were: out-of-pocket--9.7 cents, standardized costs--12.5 cents, and replacement costs--13.6 cents per hundredweight. The spread between the lowest (out-of-pocket costs) and the highest (replacement costs) ranged from 3.1 cents for Texas-Louisiana to 5.3 cents for Arkansas-Mississippi.

Storing

Storing costs were lowest in California and highest in Texas-Louisiana under all four costing methods. For regions combined, book storing costs averaged 45.7 cents per hundredweight, and ranged from 30.2 cents in California to 53.0 cents in Texas-Louisiana; while out-of-pocket costs averaged 26.2 cents; standardized costs--52.9 cents; and replacement costs--64.4 cents. The spread between out-of-pocket and replacement costs varied among regions, from 17.9 cents in California to 49.2 cents in Texas-Louisiana.

Loading Out

Loading out costs for truck shipment were lowest in Texas-Louisiana and highest in Arkansas-Mississippi, while for rail shipment these positions were reversed. California was not included in the rail cost comparisons, since none of the sample dryers in this region reported loading out for rail shipment during 1965-66.

Table 9.--Weighted average costs per hundredweight, by regions, functions, costing methods, and modes of transportation, 1965-66

Function and costing method <u>1/</u>	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined
	<u>Cents</u>			
<u>Receiving:</u>				
Out-of-pocket costs.....	3.9	3.4	3.9	3.6
Book costs.....	4.7	4.0	4.9	4.3
Standardized costs.....	4.9	4.2	5.2	4.5
Replacement costs.....	5.2	4.5	5.5	4.8
<u>Drying:</u>				
Out-of-pocket costs.....	10.4	9.0	12.2	9.7
Book costs.....	12.6	10.5	15.1	11.6
Standardized costs.....	14.1	11.2	16.0	12.5
Replacement costs.....	15.7	12.1	17.3	13.6
<u>Storing:</u>				
Out-of-pocket costs.....	27.8	30.9	17.5	26.2
Book costs.....	50.1	53.0	30.2	45.7
Standardized costs.....	57.4	64.9	30.3	52.9
Replacement costs.....	69.4	80.1	35.4	64.4
<u>Loading out for truck shipment:</u>				
Out-of-pocket costs.....	5.0	4.3	4.4	4.3
Book costs.....	6.1	5.3	5.6	5.4
Standardized costs.....	6.4	5.5	5.8	5.7
Replacement costs.....	6.6	6.0	6.1	6.1
<u>Loading out for rail shipment:</u>				
Out-of-pocket costs.....	3.3	4.3	--	3.9
Book costs.....	4.2	5.4	--	4.9
Standardized costs.....	4.4	5.8	--	5.2
Replacement costs.....	4.8	6.3	--	5.7
<u>Four-function total with:</u>				
<u>Loading out for truck shipment:</u>				
Out-of-pocket costs.....	47.1	47.6	38.0	43.8
Book costs.....	73.5	72.8	55.8	67.0
Standardized costs.....	82.8	85.8	57.3	75.6
Replacement costs.....	96.9	102.7	64.3	88.9
<u>Loading out for rail shipment:</u>				
Out-of-pocket costs.....	45.4	47.6	--	43.4
Book costs.....	71.6	72.9	--	66.5
Standardized costs.....	80.8	86.1	--	75.1
Replacement costs.....	95.1	103.0	--	88.5

1/ A detailed description of various costing methods is included in the appendix.

For Truck Shipment

Book loading out costs for shipment by truck averaged 5.4 cents per hundredweight for regions combined, and ranged from 5.3 cents in Texas-Louisiana to 6.1 cents in Arkansas-Mississippi. Combined average out-of-pocket costs were 1.1 cents lower than book costs, while standardized and replacement costs were 0.3 and 0.7 cent higher.

For Rail Shipment

Loading out costs for rail shipment for regions combined were 0.4 and 0.5 cent less per hundredweight than for shipment by truck, depending upon the costing method cited. Book loading out costs per hundredweight were 4.2 cents in Arkansas-Mississippi, 5.4 cents in Texas-Louisiana, and averaged 4.9 cents for the two regions. The spread between out-of-pocket and replacement costs was 1.5 cents for Arkansas-Mississippi to 2.0 cents for Texas-Louisiana--an average spread of 1.8 cents per hundredweight.

Four-Function Total

Total operating costs per hundredweight for receiving, drying, storing, and loading out, with loading out for both truck and rail shipments, were developed by addition of the appropriate functional costs for each costing method and region. The difference in costs between the four functions, combined with loading out for truck shipment and those with loading out for rail shipment, reflects the difference in loading out costs for the two modes of transportation. With loading out for truck shipment, book costs per hundredweight ranged from 55.8 cents in California to 73.5 cents in Arkansas-Mississippi, with a combined-regions cost of 67.0 cents. Costs per hundredweight, based on the replacement costing method, were 64.3 cents in California, 96.9 cents in Arkansas-Mississippi, and 102.7 cents in Texas-Louisiana, with a regions-combined cost of 88.9 cents. The spread between out-of-pocket and replacement costs was 26.3 cents per hundredweight in California; 49.8 cents in Arkansas-Mississippi; 55.1 cents in Texas-Louisiana; and 45.1 cents for regions combined.

Principal Cost Items

Four principal cost items--depreciation, interest, direct labor, and administrative overhead--accounted for most costs for the various functions. Depending on costing method employed and region, these four cost items accounted for 68 to 79 percent of the total operating costs (tables 10 and 11). Depreciation was the single most important cost item under all three costing methods in Arkansas-Mississippi and Texas-Louisiana. Depreciation and interest varied considerably between book and replacement costs while labor, overhead, and "other" were constant under all costing methods.

A detailed breakdown of all operating costs, by regions, is shown in appendix tables 1 through 4.

Table 10.--Weighted average cost per hundredweight of combined dryer-storage functions (receiving, drying, storing, and loading out), with loading out for truck shipment, by regions, costing methods, and principal cost items, 1965-66 1/

Costing methods and principal cost items	Arkansas- Mississippi		Texas- Louisiana		California		Regions combined	
	Ct.	Pct.	Ct.	Pct.	Ct.	Pct.	Ct.	Pct.
<u>Book costs</u>								
Depreciation.....	18.1	25	20.8	29	11.3	20	17.3	26
Interest.....	8.3	11	4.4	6	6.5	12	5.8	9
Direct labor.....	17.2	23	13.3	18	13.6	24	14.0	21
Admin. overhead...	8.8	12	12.1	17	6.6	12	9.8	14
Other.....	21.1	29	22.2	30	17.8	32	20.1	30
Total.....	73.5	100	72.8	100	55.8	100	67.0	100
<u>Standardized costs</u>								
Depreciation.....	20.7	25	22.1	26	11.6	20	18.4	24
Interest.....	15.0	18	16.1	19	7.7	13	13.3	18
Direct labor.....	17.2	21	13.3	15	13.6	24	14.0	18
Admin. overhead...	8.8	11	12.1	14	6.6	12	9.8	13
Other.....	21.1	25	22.2	26	17.8	31	20.1	27
Total.....	82.8	100	85.8	100	57.3	100	75.6	100
<u>Replacement costs</u>								
Depreciation.....	28.8	30	31.3	30	15.6	24	25.8	29
Interest.....	21.0	21	23.8	23	10.7	17	19.2	22
Direct labor.....	17.2	18	13.3	13	13.6	21	14.0	16
Admin. overhead...	8.8	9	12.1	12	6.6	10	9.8	11
Other.....	21.1	22	22.2	22	17.8	28	20.1	22
Total.....	96.9	100	102.7	100	64.3	100	88.9	100

1/ A detailed description of various costing methods is included in the appendix.

Table 11.--Weighted average cost per hundredweight of combined dryer-storage functions (receiving, drying, storing, and loading out), with loading out for rail shipment, by regions, costing methods, and principal cost items, 1965-66 1/

Costing methods and principal cost items	Arkansas- Mississippi	Texas- Louisiana	California	Regions combined				
	Ct.	Pct.	Ct.	Pct.	Ct.	Pct.	Ct.	Pct.
<u>Book costs</u>								
Depreciation.....	17.7	25	20.9	29	--	--	17.2	26
Interest.....	8.5	12	4.3	6	--	--	5.8	9
Direct labor.....	17.1	24	13.2	18	--	--	13.9	21
Admin. overhead...	8.2	11	12.0	16	--	--	9.5	14
Other.....	20.1	28	22.5	31	--	--	20.1	30
Total.....	71.6	100	72.9	100	--	--	66.5	100
<u>Standardized costs</u>								
Depreciation.....	20.5	25	22.2	26	--	--	18.3	24
Interest.....	14.9	19	16.2	19	--	--	13.3	18
Direct labor.....	17.1	21	13.2	15	--	--	13.9	18
Admin. overhead...	8.2	10	12.0	14	--	--	9.5	13
Other.....	20.1	25	22.5	26	--	--	20.1	27
Total.....	80.8	100	86.1	100	--	--	75.1	100
<u>Replacement costs</u>								
Depreciation.....	28.6	30	31.4	30	--	--	25.8	29
Interest.....	21.1	22	23.9	23	--	--	19.2	22
Direct labor.....	17.1	18	13.2	13	--	--	13.9	15
Admin. overhead...	8.2	9	12.0	12	--	--	9.5	11
Other.....	20.1	21	22.5	22	--	--	20.1	23
Total.....	95.1	100	103.0	100	--	--	88.5	100

1/ A detailed description of various costing methods is included in the appendix.

APPENDIX

Appendix table 1.--Regions combined: Weighted average costs per hundredweight for receiving, drying, storing, and loading out rough rice, 1965-66

Cost item	Receiving	Drying	Storing	Loading out for		Combined cost	
	by truck			shipment by--		loading out to 1/	
				Truck	Rail	Truck	Rail
				-Cents-			
<u>Fixed costs:</u>							
Bldg. & equipment insurance.	0.068	0.172	2.605	0.094	0.077	2.939	2.922
Bldg. & equipment taxes.....	.093	.251	3.841	.120	.115	4.305	4.300
Licenses & bonds.....	--	--	.107	--	--	.107	.107
Bldg. & equipment leases.....	.006	.038	.168	.020	.022	.232	.234
<u>Bldg. & equipment depreciation: 2/</u>							
Book cost.....	.552	1.554	14.275	.937	.802	17.318	17.183
Standardized cost.....	.619	1.912	14.959	.917	.891	18.407	18.381
Replacement cost.....	.818	2.673	21.104	1.203	1.214	25.798	25.809
<u>Interest on investment: 3/</u>							
Book cost.....	.130	.347	5.184	.163	.189	5.824	5.850
Standardized cost.....	.277	.897	11.748	.396	.416	13.318	13.338
Replacement cost.....	.365	1.247	17.069	.519	.568	19.200	19.249
<u>Total fixed costs: 4/</u>							
Book cost.....	.849	2.362	26.180	1.334	1.205	30.725	30.596
Standardized cost.....	1.063	3.270	33.428	1.547	1.521	39.308	39.282
Replacement cost.....	1.350	4.381	44.894	1.956	1.996	52.581	52.621
<u>Variable costs: 5/</u>							
Direct labor.....	1.537	3.739	7.140	1.641	1.502	14.057	13.918
Administrative overhead.....	1.167	1.718	5.540	1.357	1.025	9.782	9.450
Electricity, heat, etc.....	.174	.730	1.280	.305	.353	2.489	2.537
Dryer fuel.....	--	.794	--	--	--	.794	.794
Truck expense.....	.034	.212	.190	.053	.011	.489	.447
Building repairs.....	.006	.026	1.559	.007	.004	1.598	1.595
Equipment repairs.....	.198	.738	1.275	.363	.398	2.574	2.609
Insurance on rice.....	--	--	.168	--	--	.168	.168
Taxes on rice.....	--	--	.104	--	--	.104	.104
Fumigation.....	--	--	.444	--	--	.444	.444
Supplies.....	.064	.306	.313	.089	.058	.772	.741
Telephone & telegraph.....	.020	.099	.082	.024	.023	.225	.224
Switching & cooping.....	--	--	--	--	.025	--	.025
Protective services.....	--	--	.108	--	--	.108	.108
Weigh & inspect.....	.025	--	--	.030	.030	.055	.055
Brokers & commission.....	--	.001	.002	--	--	.003	.003
Audit & legal.....	.020	.100	.114	.021	.024	.255	.258
Other 6/.....	.148	.656	.814	.156	.170	1.774	1.788
Interest on working capital 7/.....	.053	.143	.386	.064	.057	.646	.639
Total variable costs.....	3.446	9.262	19.519	4.110	3.680	36.337	35.907
<u>Total costs: 8/</u>							
Out-of-pocket cost 9/.....	3.613	9.723	26.240	4.344	3.894	43.920	43.470
Book cost.....	4.295	11.624	45.699	5.444	4.885	67.062	66.503
Standardized cost.....	4.509	12.532	52.947	5.657	5.201	75.645	75.189
Replacement cost.....	4.796	13.643	64.413	6.066	5.676	88.918	88.528

See footnotes on page 19.

Appendix table 2.--Arkansas-Mississippi: Weighted average costs per hundredweight for receiving, drying, storing, and loading out rough rice, by cost item, 1965-66

Cost item	Receiving	Drying	Storing	Loading out for		Combined cost	
	by truck			shipment by--		loading out to 1/	
				Truck	Rail	Truck	Rail

See footnotes on page 19.

Appendix table 3.--Texas-Louisiana: Weighted average cost per hundredweight for receiving, drying, storing, and loading out rough rice, by cost item, 1965-66

Cost item	: Receiving	: Drying	: Storing	: Loading out for		: Combined cost	
	: by truck			: shipment by--		: loading out to 1/	
				: Truck	: Rail	: Truck	: Rail
				-Cents-			
<u>Fixed costs:</u>							
Bldg. & equipment insurance..	0.036	0.097	2.541	0.079	0.053	2.753	2.727
Bldg. & equipment taxes.....	.080	.213	5.047	.093	.140	5.433	5.480
Licenses & bonds.....	--	--	.134	--	--	.134	.134
Bldg. & equipment leases....	.002	.014	.162	.004	.026	.182	.204
Bldg. & equipment depre-							
ciation: <u>2/</u>							
Book cost.....	.506	1.426	18.021	.897	.981	20.850	20.934
Standardized cost.....	.536	1.469	19.194	.877	.974	22.076	22.173
Replacement cost.....	.732	2.072	27.236	1.194	1.352	31.234	31.392
Interest on investment: <u>3/</u>							
Book cost.....	.071	.152	4.071	.101	.096	4.395	4.390
Standardized cost.....	.249	.765	14.738	.387	.474	16.139	16.226
Replacement cost.....	.336	1.052	21.895	.524	.649	23.807	23.932
Total fixed costs: <u>4/</u>							
Book cost.....	.695	1.902	29.976	1.174	1.296	33.747	33.869
Standardized cost.....	.903	2.558	41.816	1.440	1.667	46.717	46.944
Replacement cost.....	1.186	3.448	57.015	1.894	2.220	63.543	63.869
<u>Variable costs: 5/</u>							
Direct labor.....	1.396	3.186	7.079	1.627	1.570	13.288	13.231
Administrative overhead.....	1.253	1.888	7.484	1.469	1.341	12.094	11.966
Electricity, heat, etc.....	.154	.657	1.681	.276	.334	2.768	2.826
Dryer fuel.....	--	.672	--	--	--	.672	.672
Truck expense.....	.012	.159	.239	.010	.019	.420	.429
Building repairs.....	.005	.028	1.768	.006	.005	1.807	1.806
Equipment repairs.....	.223	.808	1.984	.382	.472	3.397	3.487
Insurance on rice.....	--	--	.276	--	--	.276	.276
Taxes on rice.....	--	--	.229	--	--	.229	.229
Fumigation.....	--	--	.736	--	--	.736	.736
Supplies.....	.054	.290	.234	.058	.068	.636	.646
Telephone & telegraph.....	.020	.114	.075	.025	.026	.234	.235
Switching & coopering.....	--	--	--	--	.041	--	.041
Protective service.....	--	--	.236	--	--	.236	.236
Weigh & inspect.....	.031	--	--	.038	.041	.069	.072
Brokers & commission.....	--	--	--	--	--	--	--
Audit & legal.....	.016	.092	.101	.020	.018	.229	.227
Other <u>6/</u>.....	.113	.606	.473	.128	.122	1.320	1.314
Interest on working							
capital <u>7/</u>.....	.051	.132	.455	.063	.064	.701	.702
Total variable costs....	3.328	8.632	23.050	4.102	4.121	39.112	39.131
<u>Total costs: 8/</u>							
Out-of-pocket cost <u>9/</u>	3.446	8.956	30.934	4.278	4.340	47.614	47.676
Book cost.....	4.023	10.534	53.026	5.276	5.417	72.859	73.000
Standardized cost.....	4.231	11.190	64.866	5.542	5.788	85.829	86.075
Replacement cost.....	4.514	12.080	80.065	5.996	6.341	102.655	103.000

See footnotes on page 19.

Appendix table 4.--California: Weighted average cost per hundredweight for receiving, drying, storing, and loading out rough rice, by cost item, 1965-66

Cost item	Receiving	Drying	Storing	Loading out for		Combined cost	
	by truck			shipment by--		loading out to ^{1/}	
				Truck	Rail	Truck	Rail
				-Cents-			
<u>Fixed costs:</u>							
Bldg. & equipment insurance..	0.119	0.297	1.574	0.108	--	2.098	--
Bldg. & equipment taxes.....	.183	.476	2.587	.174	--	3.420	--
Licenses & bonds.....	--	--	.118	--	--	.118	--
Bldg. & equipment leases.....	.024	.186	.139	.064	--	.413	--
Bldg. & equipment depre-							
ciation: <u>2/</u>							
Book cost.....	.726	1.945	7.767	.913	--	11.351	--
Standardized cost.....	.890	2.634	7.016	1.014	--	11.554	--
Replacement cost.....	1.099	3.480	9.795	1.238	--	15.612	--
Interest on investment: <u>3/</u>							
Book cost.....	.302	.869	4.967	.354	--	6.492	--
Standardized cost.....	.387	1.143	5.751	.421	--	7.702	--
Replacement cost.....	.482	1.555	8.090	.535	--	10.662	--
Total fixed costs: <u>4/</u>							
Book cost.....	1.354	3.773	17.152	1.613	--	23.892	--
Standardized cost.....	1.603	4.736	17.185	1.781	--	25.305	--
Replacement cost.....	1.907	5.994	22.303	2.119	--	32.323	--
<u>Variable costs: <u>5/</u></u>							
Direct labor.....	1.448	5.012	5.385	1.720	--	13.565	--
Administrative overhead.....	1.020	1.786	2.689	1.059	--	6.554	--
Electricity, heat, etc.....	.266	.775	.684	.368	--	2.093	--
Dryer fuel.....	--	1.223	--	--	--	1.223	--
Truck expense.....	.197	.378	.277	.192	--	1.044	--
Building repairs.....	.014	.046	1.957	.013	--	2.030	--
Equipment repairs.....	.197	.540	.527	.303	--	1.567	--
Insurance on rice.....	--	--	.135	--	--	.135	--
Taxes on rice.....	--	--	--	--	--	--	--
Fumigation.....	--	--	.142	--	--	.142	--
Supplies.....	.132	.578	.455	.151	--	1.316	--
Telephone & telegraph.....	.011	.035	.016	.013	--	.075	--
Switching & coopering.....	--	--	--	--	--	--	--
Protective services.....	--	--	--	--	--	--	--
Weigh & inspect.....	.003	--	--	.003	--	.006	--
Brokers & commission.....	--	--	--	--	--	--	--
Audit & legal.....	.027	.135	.119	.023	--	.304	--
Other <u>6/</u>.....	.199	.587	.428	.116	--	1.330	--
Interest on working							
capital <u>7/</u>.....	.057	.178	.257	.064	--	.556	--
Total variable costs.....	3.571	11.273	13.071	4.025	--	31.940	--
<u>Total costs: <u>8/</u></u>							
Out-of-pocket cost <u>9/</u>	3.897	12.232	17.489	4.371	--	37.989	--
Book cost.....	4.925	15.046	30.223	5.638	--	55.832	--
Standardized cost.....	5.174	16.009	30.256	5.806	--	57.245	--
Replacement cost.....	5.478	17.267	35.374	6.144	--	64.263	--

See footnotes on page 19.

Footnotes for appendix table 1 through 4:

- 1/ Due to rounding, costs may not match exact figures in tables 9, 10, and 11.
 - 2/ Book costs--supplied by sample firms; standardized costs--depreciation calculated using rates shown on page 20; replacement costs--costs based on rebuilding facilities at 1966 costs.
 - 3/ Book costs--as shown on dryer records; standardized costs--calculated at rate of 6 percent of half of original acquisition cost; replacement costs--calculated at 6 percent of half of rebuilding facilities at 1966 cost.
 - 4/ Book cost--total of all costs shown on dryer records; standardized costs--total of dryer cost with depreciation and interest computed at the same rate for all plants; replacement costs--total of dryer costs with depreciation and interest based on 1966 building costs.
 - 5/ Supplied by sample firms.
 - 6/ Includes dues, subscriptions, travel, advertising, donations, etc.
 - 7/ Calculated at 6 percent per year, borrowed quarterly, of the out-of-pocket costs; actual expenditures of this type were eliminated.
 - 8/ Total of 4/ and 5/costs.
 - 9/ Excludes depreciation and interest on investment.
-

Definition of Terms

1. Total capacity--hundredweight of bulk warehouse space available for rough rice storage and handling as determined by ASCS for CCC for warehouses with CCC storage agreements. For dryers not approved for CCC storage, capacity ratings were obtained from either company records or manager's estimates.
2. Upright capacity--the capacity of any structure with a height greater than its diameter or width.
3. Flat capacity--the capacity of any structure with a diameter or width greater than its height.
4. Storage or working space--based on estimates obtained from dryer operators. The total capacity of each dryer was divided between storage space and working space. During harvest, drying required a considerable amount of dryer space for receiving and for holding wet, green paddy rice for tempering between dryer passes and in some cases for maintaining identity of specific lots. After the drying season this space can be used for storage. Some additional warehouse space is required for turning, quality control, cleaning, and shipping during the remainder of the year. Dryer operators estimated the minimum capacity required for turning, cleaning, and shipping after harvest, and the additional capacity required for drying during harvest. Near the end of the drying season, all except the minimum capacity needed for turning and shipping is usually filled. Records show that the additional capacity for drying is required approximately 2 months of the year. Therefore, one-sixth of the additional capacity used for drying plus the minimum space required for turning and shipping comprise the average working space for the year. For example, a dryer with a total capacity of 300,000 cwt. may require a minimum of 20,000 cwt. for turning and shipping and an additional 100,000 cwt. for drying during the harvest period. One-sixth of 1000,000 (16,667) plus the 20,000 minimum is

36,667 cwt. of average working space and 263,333 cwt. of average storage space—or 12.2 and 87.8 percent. This method was used to help allocate annual fixed costs of depreciation, taxes, insurance, and interest to the proper functions.

5. Average occupancy--average volume of rice in storage during the year.

6. Highest monthly inventory--maximum volume of rice in plant at the end of peak month during the survey period.

7. Receiving--weighing on platform (truck) scales, sampling, dumping into pit, elevating and dumping into bin above dryer, into the dryer itself, or into receiving-holding (tempering) bins until dried. Includes additional moving and handling required to place into final (dead) storage after completion of drying. When no drying or cleaning is involved, receiving would include all handling required to place into dead storage.

8. Cleaning--only if a separate operation requiring special equipment or labor or both to perform. The use of a scalper over the dryer or on the way to the tempering bin was not considered as cleaning, but was included as part of drying.

9. Drying--movement from receiving-holding (tempering) bins through dryer (to remove moisture), elevating into tempering bins to await the next drying pass, and on the last drying pass directing into dead storage or onto conveyor to complete receiving operation.

10. Storing--resting in dead storage.

11. Turning--movement from one storage location to another for quality control purposes only. If moved to assist in loading out, considered as part of loadout.

12. Loading out--removing from dead storage and loading into truck, barge, or railcar. Movement from flat to upright storage to assist in loading out (even if it could have been loaded out directly from flat storage) was charged to loading out,

Standardized Depreciation and Interest

To minimize the effects on costs of wide differences among plants in depreciation allowances and interest on investment, data were summarized using standardized rates as shown in the following rate schedule (straight-line method):

	<u>Percent</u>
Concrete or tile upright/flat structures	2.5
Metal--tanks-silos-flat structures	4.0
Wood--cribbed-"ironclad"	5.0
Office building--masonry-steel-wood	4.0
Dryer machinery and equipment.	8.0
Office furniture and equipment	8.0

Concrete buildings; machinery and equipment.	4.2
Metal buildings; machinery and equipment	5.3
Wood buildings; machinery and equipment.	6.0
Depreciable land improvement, including well, driveway, fence, railroad siding and trackage, parking lot, etc.. .	4.0

Interest allowance on capital investment of 6 percent of half the original acquisition cost was computed for all plants.

Replacement Costs

Plant replacement values based on original costs were used for computation of depreciation and interest on investment charges. Original costs were updated to 1966 building costs, using the latest edition of Boeckh's "Building Cost Indexes." In Boeckh's indexes, the date of the original cost represents an index value of the items under which the original cost was created. Therefore, to convert the original cost of a particular unit of construction to 1966 costs, the percentage differential between the two indexes (1966 index value and the index of the original cost) was determined and the original cost was multiplied by the differential.

Appendix table 5 shows the differentials used to compute replacement costs by years and types of construction. For example, assume the storage tanks for a small concrete dryer cost \$90,000 to build in 1956. The index factor to bring this cost up to 1966 costs is shown in appendix table 5 under the brick and concrete column. The index factor 1.384 multiplied by the original cost of \$90,000 gives a 1966 replacement cost value of \$124,360. The same procedure was used to update machinery and equipment costs.

Information from construction companies, engineering firms, newly built facilities, and USDA files on specific "types" of plants was used to check the validity of these calculations.

Replacement costs computed by this method were then used to calculate depreciation and interest on investment charges applicable to individual plants. Uniform rates as shown in the schedule above were used for estimating depreciation costs applicable to machinery, equipment, and buildings. Interest allowance on capital investment of 6 percent of half the replacement cost was computed for all plants. Allocation to functions was made according to the plan outlined in the next section.

Method of Allocation

Allocation of cost items to functions was made according to the following plan:

A. Fixed costs:

1. Building depreciation: Based on estimates obtained from dryer operators, the total capacity of each dryer was divided between storage capacity and working capacity, i.e., capacity needed for receiving, shipping,

Appendix table 5.--Indexes of 1966 building cost factors used to calculate dryer replacement costs, by years, 1940-66

Year	Frame	Steel	Brick and wood	Brick and steel	Brick and concrete	Machinery and equipment
1940.....	3.241	3.073	3.202	3.337	3.461	3.265
1941.....	2.935	2.987	3.035	3.220	3.376	3.112
1942.....	2.782	2.867	2.892	3.068	3.206	2.964
1943.....	2.644	2.785	2.769	2.962	3.088	2.850
1944.....	2.415	2.637	2.576	2.806	2.939	2.673
1945.....	2.257	2.524	2.395	2.658	2.776	2.518
1946.....	2.061	2.357	2.169	2.440	2.534	2.308
1947.....	1.686	2.062	1.821	2.107	2.203	1.966
1948.....	1.496	1.817	1.621	1.868	1.940	1.740
1949.....	1.563	1.748	1.624	1.810	1.870	1.721
1950.....	1.476	1.682	1.549	1.737	1.807	1.647
1951.....	1.373	1.560	1.433	1.611	1.686	1.530
1952.....	1.341	1.500	1.391	1.549	1.613	1.477
1953.....	1.323	1.435	1.357	1.485	1.535	1.427
1954.....	1.342	1.403	1.355	1.453	1.499	1.411
1955.....	1.298	1.350	1.318	1.405	1.453	1.366
1956.....	1.245	1.268	1.259	1.300	1.384	1.298
1957.....	1.229	1.204	1.225	1.273	1.331	1.253
1958.....	1.219	1.174	1.210	1.239	1.292	1.228
1959.....	1.178	1.137	1.174	1.196	1.243	1.187
1960.....	1.159	1.129	1.153	1.176	1.212	1.167
1961.....	1.159	1.134	1.144	1.165	1.182	1.157
1962.....	1.139	1.116	1.124	1.138	1.149	1.134
1963.....	1.115	1.097	1.101	1.112	1.118	1.109
1964.....	1.082	1.073	1.071	1.080	1.082	1.078
1965.....	1.047	1.041	1.038	1.044	1.042	1.042
1966.....	1.000	1.000	1.000	1.000	1.000	1.000

drying, turning, etc. The amount of depreciation costs to be allocated directly to storage and other functions was based on the ratio of storage and working capacity to total capacity. For example, assume a dryer is 90-percent average storage capacity and 10-percent average working capacity. In this case, 90 percent of the total depreciation chargeable to the operation would be allocated directly to the storage operation. The remaining 10 percent would then be allocated to all functions including storage, based on the volume handled in each function. The additional proportion of costs allocated to storage were based on the volume of rice turned during the survey period.

2. Equipment depreciation: Costs for equipment which could be identified with a particular function were allocated directly. For example, costs for such equipment as dryers, hot-spot detection systems, etc. that are used for only one purpose, were allocated directly to their function.

Items of equipment which could be identified but could not be allocated to a specific function were allocated according to the volume of rice involved. For instance, many items could be identified as being used in loading out operations, but could not be identified as equipment used specifically for loading out for truck or rail shipment. In this case, the ratio between truck and rail shipments was used for allocating these costs to truck and rail shipping.

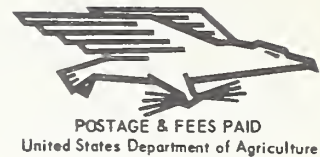
Hours of operation were used for all equipment which could not be identified as outlined above. This equipment generally consisted of the legs, conveyor systems, trippers, and other equipment that might be used in more than one function.

3. Insurance: Building insurance was allocated to functions as depreciation was in item 1. Insurance on machinery and equipment was allocated to functions, based on the proportion of the total replacement investment associated with each function.
4. Taxes: Allocated in the same manner as insurance was in item 3.
5. Licenses and bonds: All to storage.
6. Leases and rentals: Building leases were allocated to functions as building depreciation was in item 1. Leases of equipment were allocated as equipment depreciation was in item 2.
7. Interest on capital investment: Allocated as insurance was in item 3.

B. Variable costs:

8. Direct labor: Allocation to functions was based on plant records and estimates made by management.
9. Administrative overhead: Management, clerical, and home office costs are included in this item. Allocation to functions was based on estimates furnished by dryer operators and owners.
10. Electricity: Allocation was based on the hours required to handle the volume of rice involved in a specific operation. For dryers with aeration equipment, an additional \$22 for each 10,000 cwt. stored (average occupancy volume) was allocated to storage.
11. Drier fuel: All to drying.
12. Truck expense: Allocation based on use of trucks at each plant.
13. Building repairs: Allocated as depreciation was in item 1.
14. Equipment repairs: Allocated on the same basis as depreciation was in item 2.
15. Insurance on rice: All to storage.

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16. Taxes on rice: All to storage.
17. Fumigation: All to storage.
18. Supplies: Volume handled in each function.
19. Telephone and telegraph: Volume handled in each function.
20. Switching and coopering: Switching based on the volume received and shipped by rail. All coopering was allocated to loading out for rail shipment. Includes other miscellaneous transportation expenses allocated direct.
21. Protective services: Volume handled in each function.
22. Weigh and inspect: Volume received and shipped.
23. Brokers and commissions: Volume handled in each function.
24. Audit and legal: Volume handled in each function.
25. Other: Volume handled in each function.
26. Interest on working capital: Allocated based on total out-of-pocket cost applicable to each function.

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